

Rack Allocations in USA15 (and US15 ?)

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Summary of Rack needs in USA15/US15

- ROD racks
- LV/HV power supply racks
- DCS and miscellaneous racks

Issues of USA15 versus US15

- Cable runs
- Interlocking and other communications
- Rack allocations

We need to decide soon whether to pursue US15 direction

ROD Rack Requirements

Define scheme for connecting modules to RODs:

- Modularity defined by 8-way MT-8 connectors and fiber bundles proposed for optical cable plant. Not the most efficient, but it is clean and simple.

For the B-layer:

- There are 2 80Mbit links per module and there are 22 staves. Each half-stave will then use 2 8-way fiber bundles for data transmission, or 88 fiber bundles.
- Bandwidth studies suggest mapping one half-stave to one ROD (6 or 7 real modules), so there are two 8-way bundles per ROD, or 44 RODs.

For the Outer Barrel layers:

- Bandwidth studies not performed yet for new layout, but single 40Mbit link seems marginal at smaller radius. If we want to keep one link per module, then L1 should use 80Mbit links.
- Propose to use one stave per ROD for L1, so there are 38 RODs, each handling two 8-way bundles, or 16 80Mbit fibers. There would be a total of 76 bundles.
- Propose to use two staves per ROD for L2, so there are 26 RODs, each handling four 8-way bundles, or 32 40Mbit fibers. There would be a total of 104 bundles.

For the Disks:

- Propose to use four sectors per ROD, so there are 12 RODs, each handling four 8-way bundles, or 32 40Mbit fibers. There would be a total of 48 bundles.

Back of Crate card:

- System uses a single BOC card which accepts either 16 80Mbit links or 32 40Mbit links. The BOC handles an 80Mbit link as two 40Mbit links anyway.
- There would be a total of 316 data fiber bundles and 272 TTC fiber bundles.

Rack count:

- There are a total of 120 RODs and BOCs in the system described above.
- A ROD crate can accommodate up to 16 RODs, so this is almost exactly 8 crates.
- Have proposed placing no more than two ROD crates per rack, because of large size of BOC and complex and delicate cable plant that goes with it.
- This means four racks, with two crates each, for the complete ROD system.

Maintenance and diagnostic work:

- The ROD testing is now based around a PC-based test stand. It seems almost essential to have a fifth rack for the ROD test stand. It should be close to the operating RODs so that testing can be done almost *in situ*.
- Could be shared with SCT ? They are adjacent, and appear to have more space.

LV/HV Power Supply Rack Requirements

- For present pixel detector, have 1744 pixel modules.
- For power supply, have assumed two pixel modules per complex channel, two complex channels per card, and 16 cards per crate. This translates to 64 pixel modules per crate, or 28 crates total.
- Assume that in this case, there is no problem to use three crates per rack , so this means 10 racks.
- The original request was based on a larger pixel detector, so the calculated rack count was 12 for these supplies.
- The present scheme is based on a multiplicity of two, and the density assumed above has not yet been proven (prototypes are lower density).
- For this reason, requested an additional 4 racks for “contingency”. Expect that if we increase supply segmentation, power stays the same, but only additional control is needed, so space required does not double.
- In addition, there was no overhead for controllers and for additional miscellaneous functions related to the power supplies. assume an extra 2 racks.
- We have ignored rack allocations for possible implementation of large UPS system which would keep power supplies alive for 5 minutes in case of power failure, to ensure orderly shutdown. This is being discussed between ID and TC.
- Total request was 18 racks for LV/HV supplies.

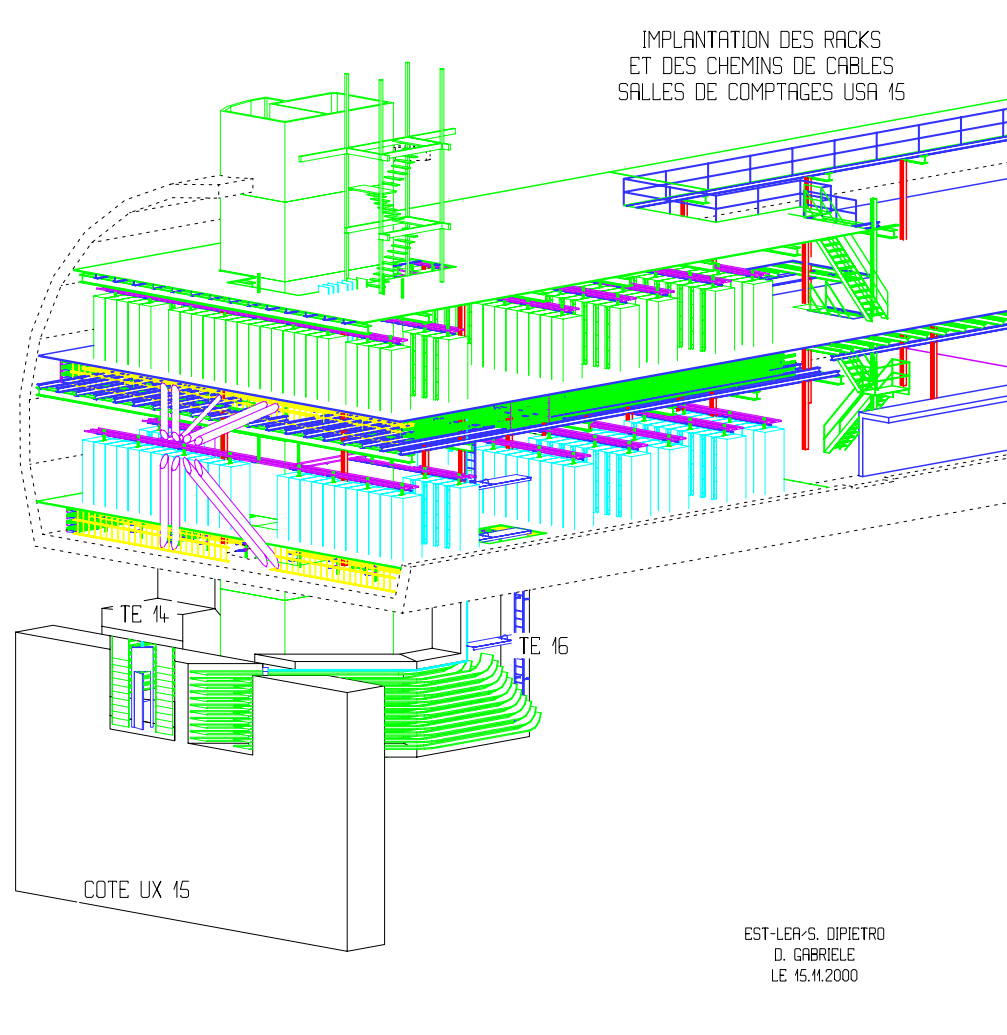
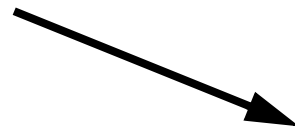
DCS and specialized UPS

- Estimate 2 racks for DCS, including local PC and CANbus diagnostic equipment.
- In addition, there will be one rack for specialized high-redundancy UPS for the I-boxes, and one rack for high-redundancy UPS for the pixel cooling system.
- The main pixel cooling racks, compressors, etc. are part of a different allocation, related to overall ID cooling. This area is located in the read of USA15 Level 1.
- The total request for DCS and UPS was 4 racks.

USA15 Cavern

Cavern has two levels for ATLAS racks:

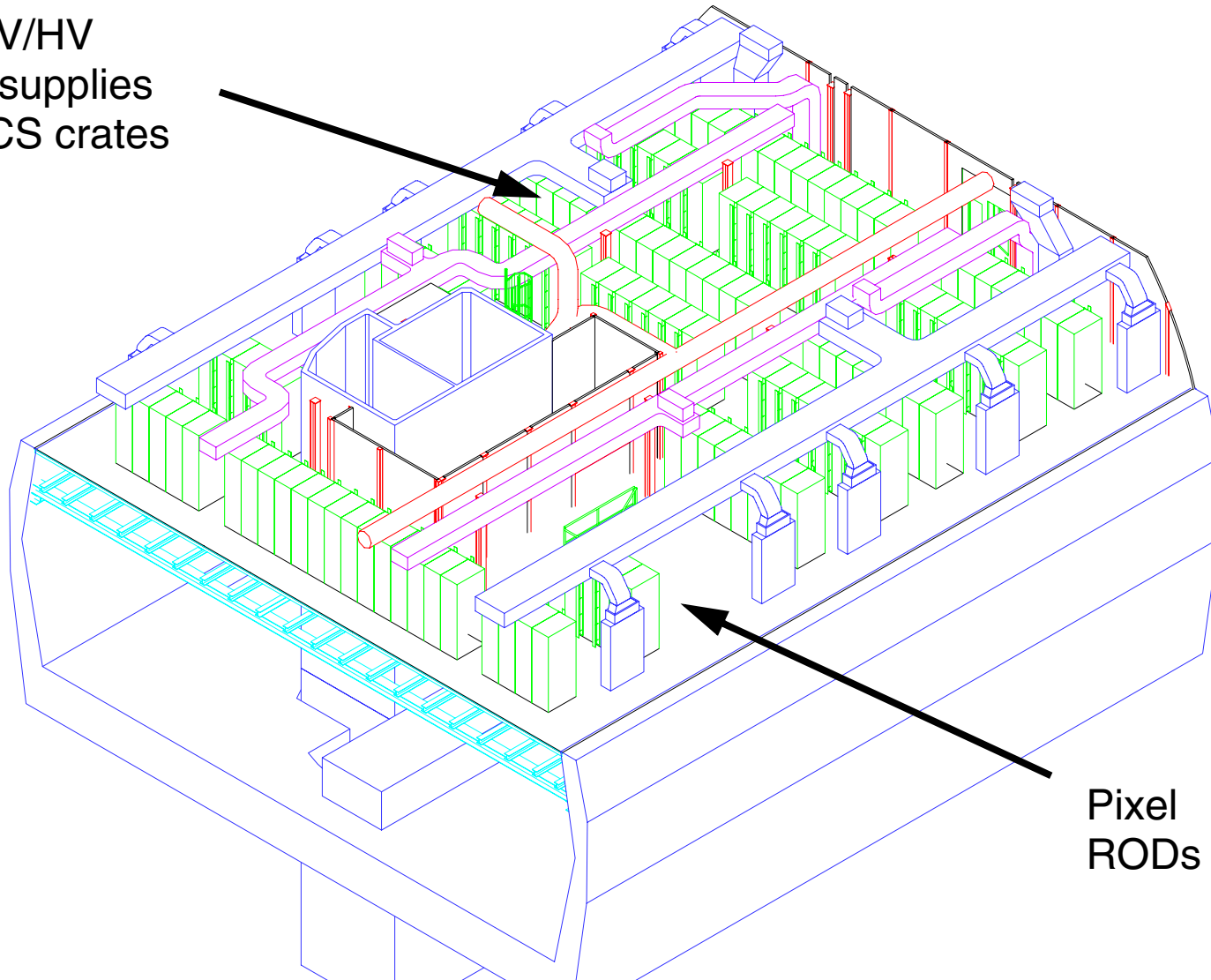
Cable trays for
ATLAS services



- Pixels and SCT are towards the front of Level 2 of the cavern.

USA15 Level 2:

Pixel LV/HV
power supplies
and DCS crates



Pixel
RODs

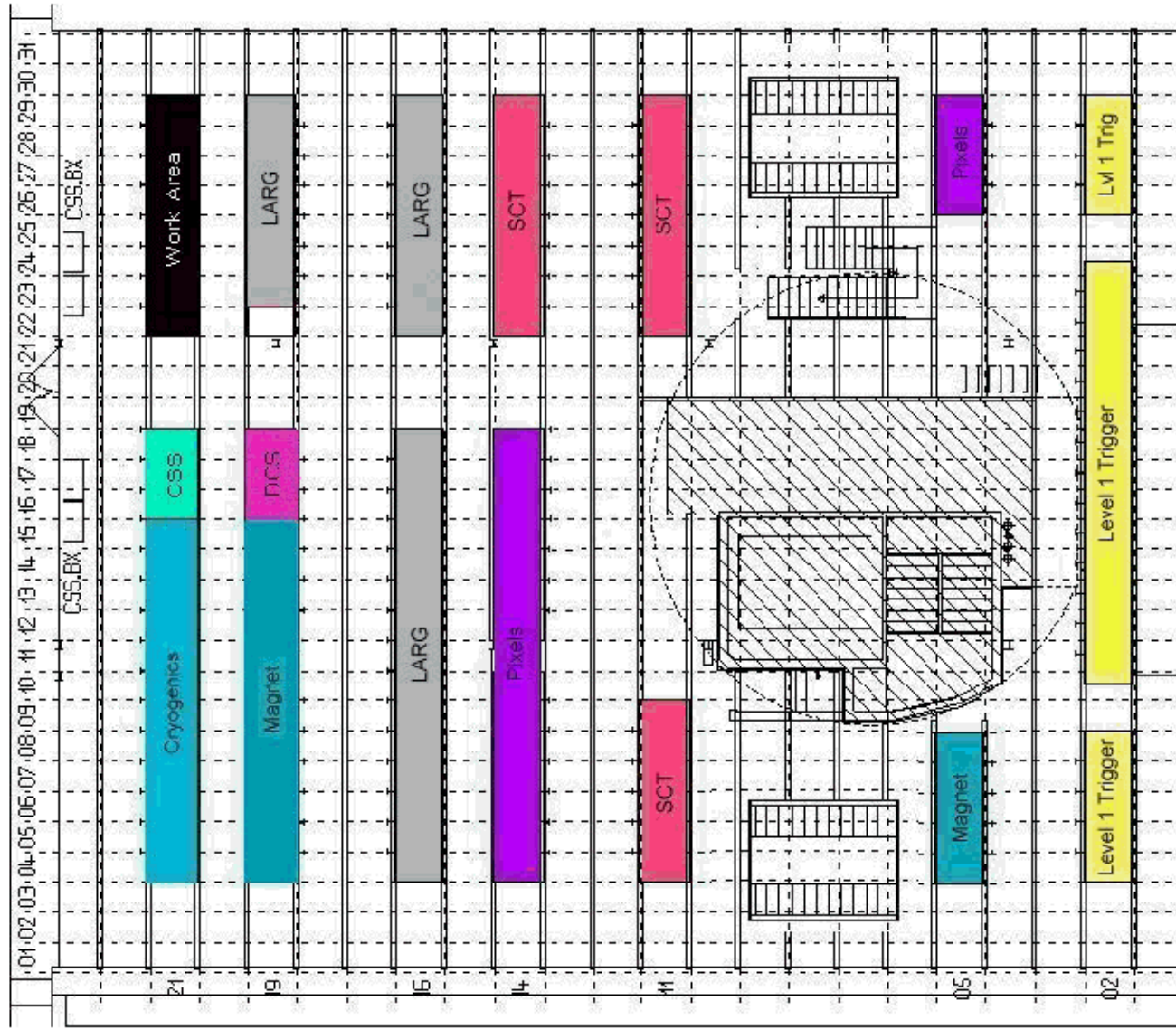
- Not clear whether we can get a 5th rack in ROD area, due to obstructions.

Tentative Rack Layout for USA15

- Pixels assigned 4 ROD racks and 15 Power Supply racks:

USA15 Level 2 - Rack Layout

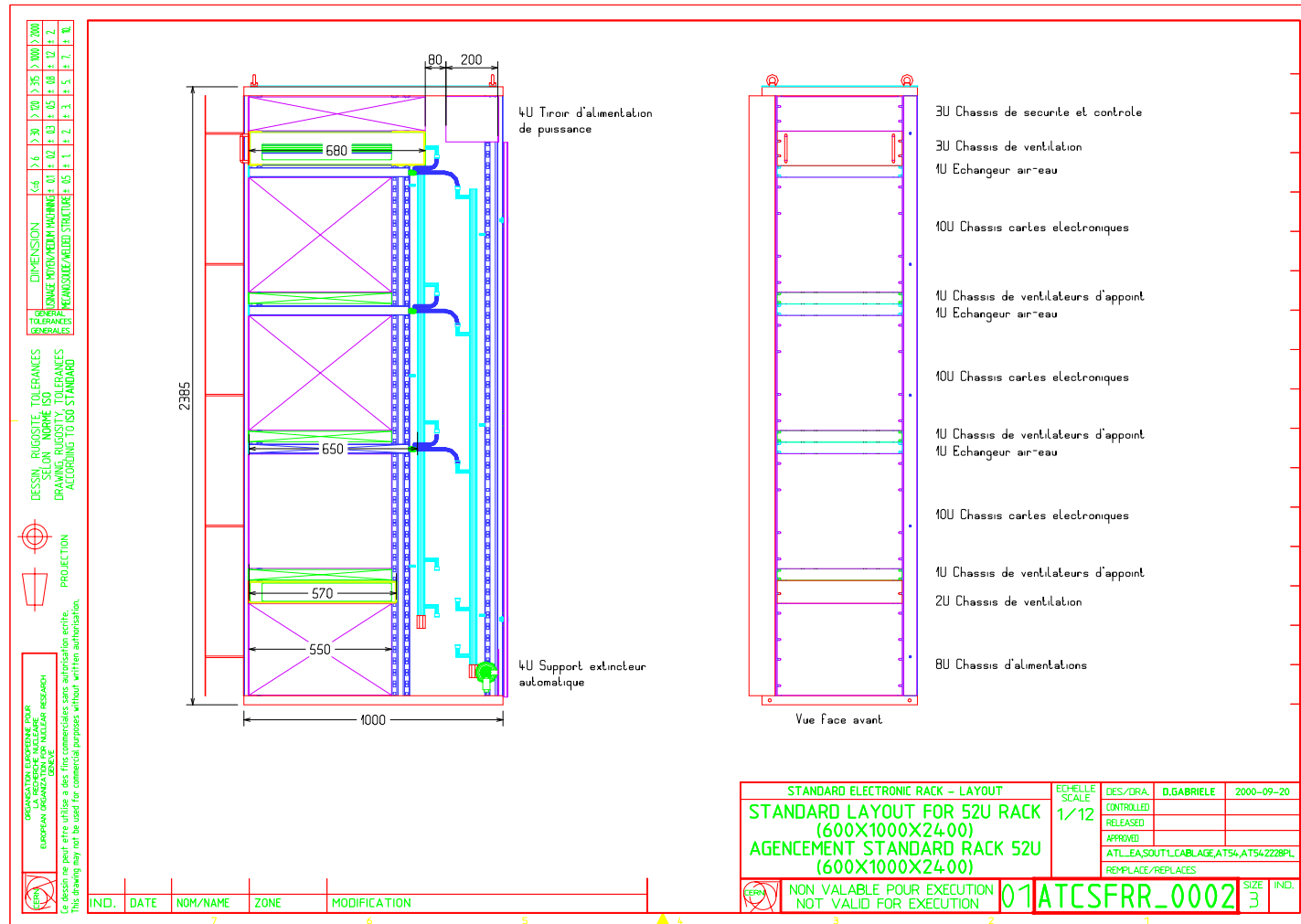
- Click on a rack or other location to identify the application or function



→
Towards
ATLAS
(UX15)

USA15 Rack Assignments

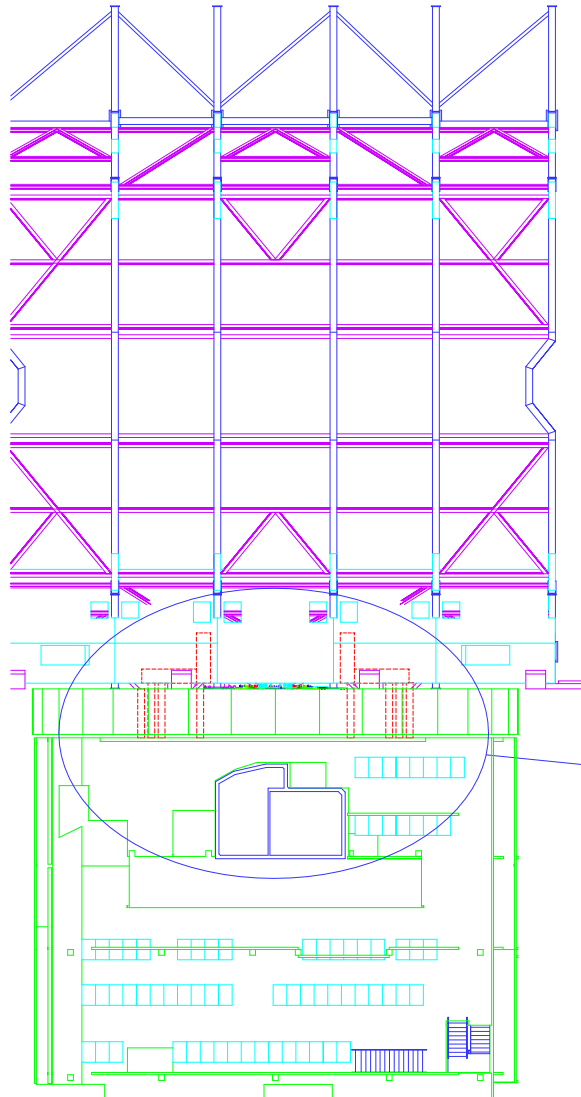
- All racks are Type A, 52U, 600x1000x2400mm. They are designed for 3 crates, with power supplies at bottom of rack, and heat exchangers under each crate:



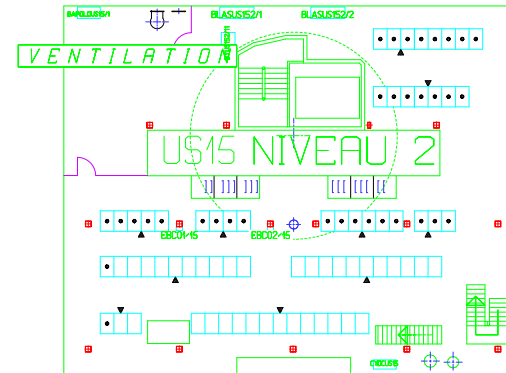
- ROD racks will be somewhat customized to incorporate large BOC and cables.

US15 Cavern

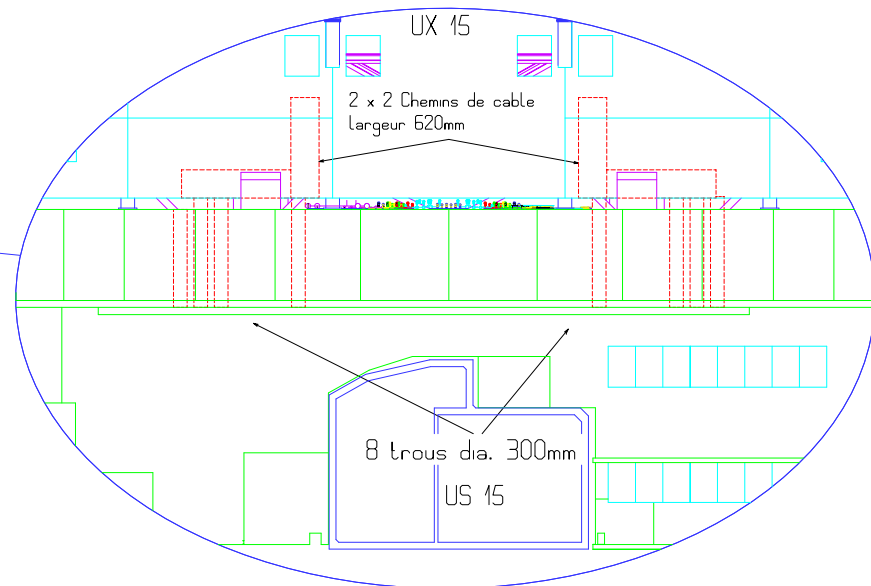
Cavern has single level partially available for ATLAS racks:



PROPOSITION
D'IMPLANTATION
DES RACKS
DANS L'US 15



35 Racks 900 x 600 x 1900 max
36 Racks 900 x 600 x 2400 max



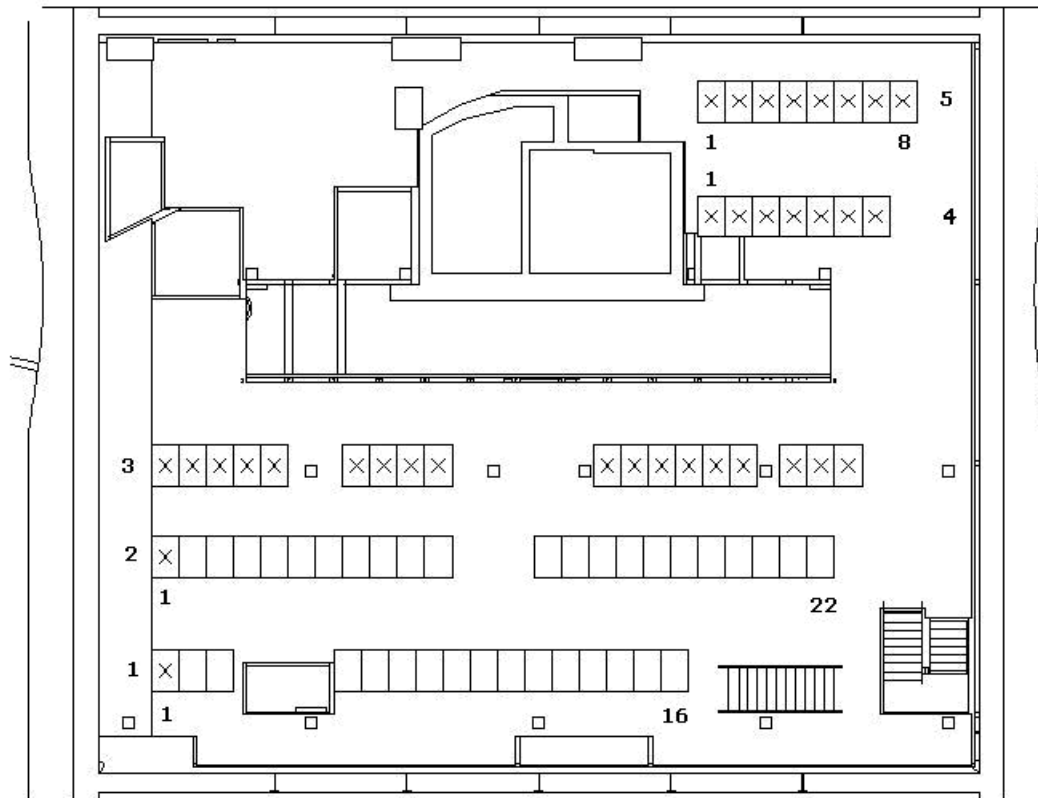
US15 Rack Assignments

- Two types of racks, depending on the allowed height:

US15 Level 2 - Rack Layout

- Click on a rack or other location to identify the application or function

↑ Direction UX15



No specific locations allocated within ATLAS at this time.

Pixels has 8 racks reserved in this area.

SCT has 11 racks reserved.

The LHC machine has 13 racks reserved.

Pixels would prefer the larger 52U racks, as it is not clear 3 crates will fit in the smaller racks. However, these racks are further from the entering cable trays.

- Racks marked with an X are Type B, 42U, 600x900x1900mm
- Other racks are Type C, 52U, 600x900x2400mm

Why Go To US15 ?

Cable lengths:

- Present estimates are based on estimates from Eric Anderssen last year.
- Maximum cable length decreases from 140m to about 120m. This is because cables on US15 side of ATLAS do not need to cross over the detector.
- Average cable length change more difficult to estimate without detailed routing information. Eric's estimate was 10-15m reduction in average length.
- For long Type 4 cables, this is a 10-15% cost reduction (few hundred KCHF ?), and a reduction in the worst run of 15% (mainly risk in operation of supplies).

Rack allocations:

- Space in USA15 is quite precious. We did not receive our full request (5+18+4), but only (4+15), so we are missing 8 racks from what we would like. According to the ATLAS database, there is only one unallocated rack in USA15.
- If we squeezed down to our present best estimates, with no contingency, we could probably fit in USA15. Would have 4 ROD racks, 10 PS racks, 1 controller rack, and 4 DCS/UPS racks.
- For now, have reserved 8 racks in US15 to reach our initial total of 27 racks. Assume that no ROD, DCS, or UPS functions would move. Only LV/HV power supplies would be placed in US15.

Disadvantages of US15:

- May have to wait 1-2 days for access to fix broken equipment.
- Can never be present during beam operation for debugging purposes.
- Interlocking system will require some cable plant between the two locations:

